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Insufficient Sleep and Incidence of Dental Caries in Deciduous Teeth among Children in Japan: A Population-Based Cohort Study(Abstract_要旨)

AUTHOR(S):

Chen, Hongyan

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京都大学	博士（社会健康医学）	氏 名	陳 紅燕
論文題目	Insufficient Sleep and Incidence of Dental Caries in Deciduous Teeth among Children in Japan: A Population-Based Cohort Study （日本における幼児の睡眠不足と齲歯発生に関するコホート研究）		
（論文内容の要旨）			
<p>Untreated dental caries in deciduous teeth affect approximate 8% of children and can lead to compromised quality of life for both children and their families. While insufficient sleep is associated with reduced salivary flow rate and impaired host resistance against cariogenic bacteria, little research on the direct effect of sleep on caries has been conducted. Prior studies suggest a link between late bedtimes and caries in deciduous or permanent teeth in children, but fail to measure sleep duration. This study aimed to examine whether late bedtime and short nighttime sleep duration at age 18 months is associated with dental caries in deciduous teeth at age 3 years using data from the Kobe Offspring Study.</p> <p>This was a population-based cohort study using health check-up data of 71 069 children born in Kobe City, Japan who were free of caries at age 18 months and had information on sleep variables at age 18 months and records of dental examinations at age 3 years. Sleep variables were assessed by parents’ response to questions “What time does your child usually wake up/go to bed?” Dental caries in deciduous teeth was assessed by qualified dentists without radiographs and was defined as the occurrence of at least one decayed, missing, or filled tooth. Data on lifestyle factors were obtained mainly from standardized parent-reported questionnaires. Multivariable logistic regression was used to evaluate the respective associations between bedtime, sleep duration and dental caries after adjusting for potential confounders. Missing values for covariates were imputed by multiple imputation.</p> <p>Percentages of children with bedtime at 21:00 or earlier, 21:00-22:00, 22:00-23:00, 23:00-0:00, 0:00 and later, and irregular were 23.1%, 42.8%, 19.8%, 5.2%, 1.1% and 8.0%, respectively. Percentage of children with sleep duration of ≤ 8 h, 9 h, 10 h, 11 h or more and irregular were 3.3%, 22.6%, 42.2%, 22.2%, and 9.6%, respectively. At age 3 years, 11 343 (16.0%) of children had dental caries. Late bedtime (after 21:00) was associated with a 1.2-1.9 increased risk of the development of caries compared with bedtime before 21:00 after adjusting for potential confounders (odds ratios 1.26 [95% CI, 1.19-1.33], 1.48 [1.38-1.58], 1.74 [1.58-1.92], 1.90 [1.58-2.29], and 1.66 [1.53-1.81] for 21:00-22:00, 22:00-23:00, 23:00-0:00, 0:00 and later and irregular bedtime, respectively). This relationship was also seen with having short (≤10 h) and irregular sleep duration compared with sleep duration of 11 hour or more, but with a less pronounced effect (odds ratios of 1.30 [95% CI, 1.15-1.47], 1.16 [1.09-1.24], 1.11 [1.05-1.18], and 1.35 [1.25-1.46] for ≤ 8, 9, 10 hours and irregular sleep duration, respectively). Similar associations were observed for different sites (mandibular or maxillary, anterior teeth or molars) and across various subgroups relating to feeding practices and oral hygiene. In particular, this association was seen in maxillary anterior teeth that are less likely to be affected by inappropriate feeding practices. The study also found that a number of baseline characteristics that are important risk factors for caries, such as lack of tooth brushing, prolonged breastfeeding, bottle-feeding, and irregular and frequent consumption of sweets, were all strongly associated with insufficient sleep.</p> <p>Having late bedtime and short nighttime sleep duration, which are experienced by more than half of children in Japan, are consistently associated with increased odds of dental caries in deciduous teeth. Exposure to having</p>			

late bedtime is common among Asian children and decreasing sleep duration has already triggered growing concern over the century. Findings of this study would thus be significant by providing needed information on a potentially modifiable risk factor for dental caries and supporting the expansion of public health strategies to provide appropriate sleep conditions in which young children can flourish.
（論文審査の結果の要旨）
<p>睡眠不足は、唾液流量を減少させ、ミュータンス連鎖球菌の局所での停滞や自浄作用の低下を引き起こし、齲歯のリスクを増やすことが示唆されている。本研究では、2004年から2014年までに神戸市で実施された乳幼児健康診査データを用いて、1歳半の就寝時刻および睡眠時間と3歳の齲歯発生との関連を多変量ロジスティック回帰を用いて検討した。</p> <p>結果として、21時前の就寝と比較して遅い（21時、22時、23時、24時以降）および就寝時刻が不規則な児は、3歳の齲歯発生のリスクがそれぞれ1.2倍から1.9倍まで増加した。一方、11時間以上の睡眠時間と比較して、短時間（8時間以下、8時間、10時間）および睡眠時間が不規則な児は、3歳の齲歯発生もそれぞれ1.1倍から1.3倍まで増加した。さらに、齲歯発生の部位（下顎または上顎、前歯または大臼歯）および摂食習慣と口腔衛生に関連するサブグループ解析からも、同様の関連が見られた。</p> <p>結論として、神戸市乳幼児健康診査を受けた1歳半の児 71 069 人を対象とした本研究より、1歳半の睡眠不足と3歳の齲歯発生に関連が認められた。</p> <p>以上の研究は、睡眠不足と児の齲歯を検討した初の疫学研究であり、乳幼児保健の向上に寄与するところが多い。</p> <p>したがって、本論文は博士（社会健康医学）の学位論文として価値あるものと認める。</p> <p>なお、本学位授与申請者は、平成 31 年 3 月 26 日実施の論文内容とそれに関連した試問を受け、合格と認められたものである。</p>
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